

CLAIMS

1. A silicon nitride film formation method, comprising:
heating a substrate to be subjected to film formation to a substrate temperature;
heating a wire to a wire temperature;
5 supplying silane, ammonia, and hydrogen gases to the heating member; and
forming a silicon nitride film on the substrate.
2. The method of claim 1, wherein the substrate temperature is in the range of about 200
- 400°C.
3. The method of claim 1, wherein the wire temperature is in the range of about 1800 -
10 2100°C.
4. The method of claim 1, further comprising conducting the silicon nitride film
formation method at a pressure in the range of about 10 - 50 millitorr.
5. A method for forming a silicon nitride film, comprising:
providing a process chamber;
15 heating a substrate contained within the process chamber to a substrate temperature;
heating a wire contained within the process chamber to a wire temperature;
supplying a silicon precursor material to the process chamber;
supplying a nitrogen precursor material to the process chamber;
supplying a process gas to the process chamber; and
20 forming a silicon nitride film on the substrate.
6. The method of claim 5, wherein the silicon precursor material is selected from the
group consisting of SiH_4 , Si_2H_6 , and SiH_2Cl_2 .

7. The method of claim 5, wherein the nitrogen precursor material is selected from the group consisting of N_2 and NH_3 .

8. The method of claim 5, wherein the process gas comprises hydrogen.

9. The method of claim 5, wherein the substrate temperature is in the range of about 200 - 400°C.

10. The method of claim 5, wherein the wire temperature is in the range of about 1800 - 2100°C.

11. The method of claim 5, further comprising conducting the silicon nitride film formation method at a pressure in the range of about 10 - 50 millitorr.

10 12. Apparatus for forming a silicon nitride film on a substrate, comprising:
a process chamber;
a substrate heater positioned within said process chamber, said substrate heater
configured to receive the substrate;
a wire positioned within said process chamber;
15 a supply of silicon precursor material operatively associated with said process
chamber;
a supply of nitrogen precursor material operatively associated with said process
chamber; and
20 a supply of process enhancement gas operatively associated with said process
chamber.

13. The apparatus of claim 12, wherein the silicon precursor material is selected from the group consisting of SiH_4 , Si_2H_6 , and SiH_2Cl_2 .

14. The apparatus of claim 12, wherein the nitrogen precursor material is selected from the group consisting of N_2 and NH_3 .

15. The apparatus of claim 12, wherein the process gas comprises hydrogen.

16. Apparatus for forming a silicon nitride film on a substrate, comprising:
a process chamber;
heating means positioned within said process chamber for heating the substrate to a substrate temperature;
a wire positioned within said process chamber;
means for providing a silicon precursor material to said process chamber;
means for providing a nitrogen precursor material to said process chamber; and
means for supplying a process enhancement gas to said process chamber.

17. The apparatus of claim 16, wherein said means for providing a silicon precursor material to said process chamber comprises means for providing SiH_4 to said process chamber.

18. The apparatus of claim 16, wherein said means for providing a nitrogen precursor material to said process chamber comprises means for providing NH_3 to said process chamber.

19. The apparatus of claim 16, wherein said means for supplying a process enhancement gas to said process chamber comprises means for providing H_2 to said process chamber.